Coast Guard Academy Curriculum 2020
...developing our intellectual assets

Prompted by the Board of Trustees of the United States Coast Guard Academy and Admiral Loy, Commandant, the Academy has reviewed its curriculum in light of the Coast Guard 2020 and the President's Council on Coast Guard Roles and Missions (CORM). In addition, close attention was given to the USCG Academy Mission, its Guiding Principles, Commandant's Guidance and the CGA Shared Learning Outcomes that define the characteristics of its graduates. These Outcomes state explicit expectations of leadership ability, personal and professional qualities, critical thinking ability, the ability to acquire, integrate and expand knowledge as well as communication effectiveness.

In the course of that review, conducted by the Dean's Cabinet, particular attention has been paid to two questions: 1) why (the criteria) does the Academy have any majors at all; and 2) why (the array) does the Academy have the particular majors that it offers? Implicit in both questions is an underlying one: does it make sense for the Academy to structure its curriculum in this way in view of the realities likely to confront the service when 20 years from now current cadets will be senior leaders of the Service. In short, are we preparing cadets for the world of tomorrow?

The mission of the Coast Guard has always been public service. As Coast Guard 2020 makes clear, that mission will not change with the passage of time. But the overarching mission of public service will change its areas of emphasis and will likely acquire new dimensions. In fact, Coast Guard 2020 identifies five challenges and opportunities confronting the service in the next twenty years:

1. As a result of ***A Changing World***, non-traditional and transnational threats to U.S. national security will arise, requiring the United States to integrate economic, diplomatic and security initiatives, often in cooperation with other countries. These threats will include a broad range of problems from terrorism and port security to illegal immigration, illegal drugs and international criminal conspiracies.
2. As a result of ***Economic Globalization***, U.S. maritime trade may triple by 2020, dramatically increasing congestion on America's waterways, boosting volumes of hazardous materials in transit, and endangering the environment from more intensive traffic.
3. ***Shifting Demographics*** means that our global interactions with developing countries will intensify at the same time that a more diverse domestic labor pool will increase the proportion of women and minorities in the Coast Guard. These two trends will place a greater premium on developing the ability of people from diverse backgrounds to work together effectively.
4. ***Technology Revolutions*** in fields ranging from communications and data integration to surveillance and information webs will make "the sea yield to knowledge" as never before, requiring everyone in the service to become a lifelong learner at the risk of otherwise becoming obsolescent.

5. ***Finite Resources and Fragile Environments*** in 2020 will dwarf the environmental concerns of 2000 as global prosperity expands, resources are devoured at unprecedented rates, and public consciousness of environmental threats spreads throughout the world.

To ensure that the officer corps of the future is able to anticipate these challenges and opportunities, it is incumbent on the Academy to appraise its curriculum (looking at the array of majors first, with a review of the core in 2003) in light of the findings of Coast Guard 2020 as summarized above. The Academy has addressed the question of whether the world of the future requires it to offer majors as the foundation of its curriculum. As this discussion suggests, a more complex world will require officers with specialized training. As clearly indicated in its Mission Statement, the Coast Guard Academy is a unique and specialized institution of higher education and training with the primary mission of preparing its graduates for careers as commissioned officers in the Coast Guard. Because of its professional and military orientation, the Academy's curriculum is structured more formally than that of a civilian college. All graduates, regardless of their field of specialization, receive Bachelor of Science degrees.

The Criteria for Majors:

The curriculum at the Coast Guard Academy carefully balances the goals of the service to obtain officers who are well-grounded in the basics of both qualitative and quantitative reasoning with the need for more specialized officers. The core courses help meet the first goal while the majors help meet the second. These goals are valid today and will be valid in the year 2020 and beyond.

The majors program contributes significantly to the maturity and intellectual growth of cadets. Each major provides an integrated set of upper-level courses that build on the fundamentals and make use of the skills learned in the core courses. In addition, the majors provide opportunities for individual and collaborative projects that are important bridges between "text-book" learning and independent, self-managed study. It is in the majors program that cadets learn to wrestle with important questions such as "what information do I need to solve this problem and how will I obtain the needed information?" They also learn to organize and write complete reports, to present talks to varied audiences, and to critique their own work and that of others. To be sure, some of this can be accomplished in lower-level courses but not with the same intensity and not in situations that are as close to those they will experience after graduation. They also learn about sources of information and become acquainted with the work of others in a field, thereby laying the foundation for increased productivity in the future.

By making available specialized courses in various fields of importance to the Coast Guard, the majors provide the prerequisites necessary for officers to enter a quality post-graduate program, thus enhancing their value to the Coast Guard and encouraging a desirable commitment to life-long learning. This avenue would not be available in the absence of the majors program.

The majors program is necessary to attract applications from some of the best students in the country. Many of these students identify closely with fields of specialization and, additionally, are concerned with the long-term opportunities afforded by their choice of careers. A majors program not only tells prospective students that they can pursue a field of specialization at the Academy but also that service in the Coast Guard will allow them to make use of their expertise. In short, the Academy must offer a majors program to remain competitive with other colleges for these students.

The majors program is also necessary to attract and retain faculty members who are experts in their fields. Such members greatly enhance the credibility of the faculty and contribute immeasurably to the education of cadets. The value of a class is greatly increased if the faculty member leading it has an intimate association with the field and speaks from a background of practical experience. Therefor, each Department must offer at least one major. In addition to providing a quality education, many of these faculty members are valuable resources to the Coast Guard outside the Academy.

The Current Array of Majors:

The current array of majors include the following:

- Engineering
  - Civil Engineering
  - Electrical Engineering
  - Mechanical Engineering
  - Naval Architecture and Marine Engineering
- Operations Research
- Marine and Environmental Sciences
- Management
- Government

The nature and mission of the Academy require that its core curriculum be broad and diverse. This curriculum necessitates the establishment of academic departments organized by discipline. This, in turn, provides an opportunity for cadets to further explore the richness and depth of the associated academic disciplines via the mechanism commonly known as an undergraduate major. It is this natural extension that provides a set of majors that are by design in line with Coast Guard expectations.

Furthermore, these offerings have been developed, in response to the factors and criteria mentioned in the previous sections of this paper. The majors do attract a diverse and talented pool of applicants, they allow for the retention and professional development of a vibrant faculty, and they provide the disciplinary frameworks necessary for the enhanced intellectual growth of the cadets. In addition, the majors have been strategically chosen and designed to meet the needs of the evolving Coast Guard. They provide officers with an educational foundation and specialization in those fields most needed by the service. This solid undergraduate education allows many of our graduates to pursue further specialization via post-graduate education. This necessitates constant

curriculum review and modification that is guided by the evolving standards associated with each of the disciplines. Thus it is important to note that although the names of the majors may be relatively static, the academic content and its delivery is in a continuous state of evolution. This flexibility inherent in the present framework allows for academic adjustments within the curriculum that respond to the future Coast Guard environment.

Engineering

Academy engineering graduates are, by far, the predominant source of engineers in the officer corps of the U.S. Coast Guard. The number of graduate engineers entering the officer corps annually from all other sources can be counted in single digits. If the Coast Guard is to maintain a cadre of officers qualified in those engineering disciplines which currently support the service, there does not appear to be any reasonable alternative to the engineering programs at the Academy.

Officer engineers represent a critical source of engineering expertise in the rapidly evolving Coast Guard. Officers serve primarily because of their loyalty and dedication to the service. This is a unique manifestation of their education and indoctrination into the service through their Academy experience. Their dedication to the institution is not just because it's a job nor is it for profit. It stems more from a true sense of devotion to an organization of which they consider themselves an integral part. A selfless interest in the good of the Coast Guard is the primary motivation for service for any good officer and engineering officers are exemplars of this principle.

The foundation for the level of excellence of Coast Guard officer engineers is laid in the admissions process of the Academy. This, coupled with the successful completion of a rigorous engineering curriculum, produces an intelligent and capable cohort of technical graduates. These graduates go on to outstanding careers in all areas of the Coast Guard. They also comprise a pool from which the service selects personnel for engineering postgraduate programs. Graduates of these programs are some of the most qualified engineers available anywhere. As a group they are unsurpassed in either technical ability or dedication to their profession. There is no other source of engineering professionals that can come close to rivaling this group for loyalty, dedication, and technical expertise.

The Coast Guard is dependent on a highly technical and extremely expensive infrastructure. Surface vessels, airplanes, communications equipment, and shore plant facilities represent a huge investment. Only a well-founded engineering capability in the officer corps will ensure that these assets are always managed in a manner best serving the Coast Guard. The Engineering program at the United States Coast Guard Academy is focused on meeting the needs of the Coast Guard for highly dedicated junior officers who are able to function as technically competent professionals in any officer assignment and especially in those assignments related to engineering an technology.

Civil Engineering

As the Coast Guard progresses, it will require a dynamic program of facilities planning and management, and replacement, repair, and maintenance of the shore plant to retain a physical plant appropriate for the Coasts Guards needs. The Civil Engineering major will continue to provide graduates capable of success in the field of facilities engineering and management.

Electrical Engineering

The CGA's ECE program will continue to be a sound undergraduate educational program focused on preparing future officers to be leaders in developing and implementing new technologies in the Coast Guard. The ECE program will continue to provide an excellent technical base with particular emphasis in systems and computer engineering. Cadets in this program will become critical thinkers who can use computer resources and analytical methods to solve real world technical problems of the 21st century.

Mechanical Engineering

Future Coast Guard operations with more and more sophisticated technical mechanical equipment will require a workforce which can understand and use existing and new technologies to execute missions more effectively and efficiently. The Mechanical Engineering program at the United States Coast Guard Academy is focused on meeting the need for technically competent engineering professionals especially in the areas of Mechanical, Naval, and Aeronautical engineering.

Naval Architecture and Marine Engineering

Future pressure on our nation's maritime regions will continually increase the demand for Coast Guard services and require a workforce which can adapt to evolving technologies and be capable of executing missions more effectively and efficiently. The Naval Architecture and Marine Engineering program at the United States Coast Guard Academy will continue to provide Coast Guard officers who are technically competent maritime professionals.

Operations Research

The Coast Guard 2020 Vision sees a nation full of hope and promise as it looks to a new millennium. It predicts significant challenges, risks and uncertainties that will undoubtedly accompany the opportunities that lie ahead. The demands on the Coast Guard will continue to increase while resources remain fairly constant. Leading in this environment will require the ability to ask the right questions, gather the right data, and analyze this data to support decisions for the future. Leaders must be able to project possible scenarios, place probabilities on them, simulate different strategies and then make decisions based on Coast Guard mission criteria. The Operations Research major educates officers in the thought processes of handling uncertainty through the use and analysis of available information. Leaders can be trained to perform tasks that are known, but must be educated to meet challenges that are uncertain.

The Operations Research program maintains courses to challenge the talented undergraduates in this major. The course sequence refines the analytical ability of each student. Graduates have a sound understanding of mathematical modeling and data analysis as well as an ability to use available computer technology. In the spring semester of their first class year, all cadets demonstrate their acquired knowledge and skills in a capstone Operations Analysis course. Consulting teams of cadets are assigned to projects submitted by various Coast Guard units. At the end of the semester each team gives a well-organized written and oral presentation of results. These senior projects create an opportunity for an on-going exchange of ideas between the faculty, cadets and other Coast Guard units. The Department of Mathematics values external input from members of the Coast Guard as well as cohort institutions in maintaining its program excellence.

Marine and Environmental Sciences

Future increases in the use of our nation's waterways and exploitation of its marine resources will continually increase the demand on the Coast Guard to protect the marine environment and its living resources. Meeting this challenge will require a technically competent workforce of maritime professionals who can interact effectively with federal, state and local government agencies, various maritime industries, and citizen groups. In addition, increasing demands will continue to occur in an environment of limited resources and assets. Therefore the future Coast Guard workforce must be able to utilize and adopt evolving technologies to meet these demands more effectively and efficiently.

The Marine and Environmental Sciences major provides a multi-disciplinary, technical education in the marine and environmental sciences that is closely aligned with Coast Guard missions. The curriculum stresses understanding of the complex relationships between humans, and the land, oceans, and atmosphere. This knowledge is applied to studies of the scientific and management issues pertaining to the protection of marine resources. Marine and Environmental Sciences graduates have a solid technical foundation for a variety of career paths and postgraduate studies.

Management

As the Coast Guard 2020 report clearly suggests, the dawn of the 3rd millennium will greet the United States with significant challenges. Along with rapid globalization and techno-centric changes in the world of business and management, the role of international trade in the U.S economy will continue to expand, as will the size of the maritime industry. The Coast Guard will need to deploy a highly skilled workforce that is adept at managing and leading a flexible, and technologically sophisticated, multi-mission organization. The Management program at the Coast Guard Academy is poised to help the service meet the challenges it will face in the 21st century.

The Management program must maintain its excellence through an innovative academic program, known for its quality and relevance to the Coast Guard. This will be accomplished partly through a broad-based curriculum with intellectual foundations in four areas: leadership and the behavioral sciences, economics, accounting and finance, and management science and technology. Students are required to take a minimum of three courses in each of these tracks and, in addition, to develop a concentration in one. Further integration with the Coast Guard as an organization is provided through such Coast Guard-related courses as Management Control in Non-profit Organizations, Information Systems for Managers, Leadership and Organizational Development, and the major's capstone course 'Public Management Consulting'. The capstone course requires teams of 1/c majors to work, under faculty guidance and supervision, on consulting projects with Coast Guard units or other public sector organizations. In addition to the traditional emphasis on analytical skills relevant to management, the Management program promotes teamwork and communication skills in all of its courses.

Government

The mission of the Humanities Department and the Government/History major is to make sure that our cadets can think clearly, express themselves clearly, anticipate challenges, weigh alternative solutions, and develop a solid base of knowledge about their country and the world.

To respond to the challenges of the twenty-first century, as set forth in Coast Guard 2020, the Department of Humanities has recently modified its major program in Government to introduce two tracks that cadet majors choose between: public policy and international relations. Both tracks encourage cadets not merely to understand the world but to anticipate the changes that may confront them as officers in the future. Courses in both tracks address in depth the five challenges and opportunities identified in Coast Guard 2020: 1)A Changing World, 2)Economic Globalization, 3)Shifting Demographics, 4)Technology Revolutions, and 5)Finite Resources and Fragile Environments. In dealing with these five trends we prepare cadets for the public service mission that pervades all Coast Guard activities.

Innovative courses in Drugs Policy and Global Policy Studies address the *Changing World* that will require the service to "integrate diplomatic, economic, political and military initiatives to foster a more stable international system." Older standbys such as National Security Policy have been revamped to focus on transnational threats to security. Waterways Management will be offered as a capstone course when an officer attached to the Council on Foreign Relations returns next year. Two courses, International Relations and the European Union, target *Economic Globalization*. Core courses such as American Government and History of the United States ensure that all cadets are exposed to the impact of *Shifting Demographics* while majors receive further exposure to these and related issues in Public Policymaking, Democracy in America (this year's capstone course), Constitutional Law, and Law and the Courts. With respect to *Technology Revolutions*, *Finite Resources and Fragile Environments*, an advanced Honors Seminar on Literature and Technology has gone into depth on the political, economic and social impact of advancing technology. Issues of global warming, U.S. energy dependence, and water pollution are all major components of several courses.